

Graph each function without a calculator.

$$\textcircled{a} f(x) = \frac{x^2 + x - 2}{x^2 - x - 6} = \frac{x-1}{x-3}$$

$$\textcircled{b} f(x) = \frac{3x^3 + 7x^2 + 2}{-4x^3 + 5}$$

Vertical Asymptotes - zeros of denominator

Horiz Asymptotes - 3 rules

X-int - zeros of numerator

Y-int - plug 0 in for x

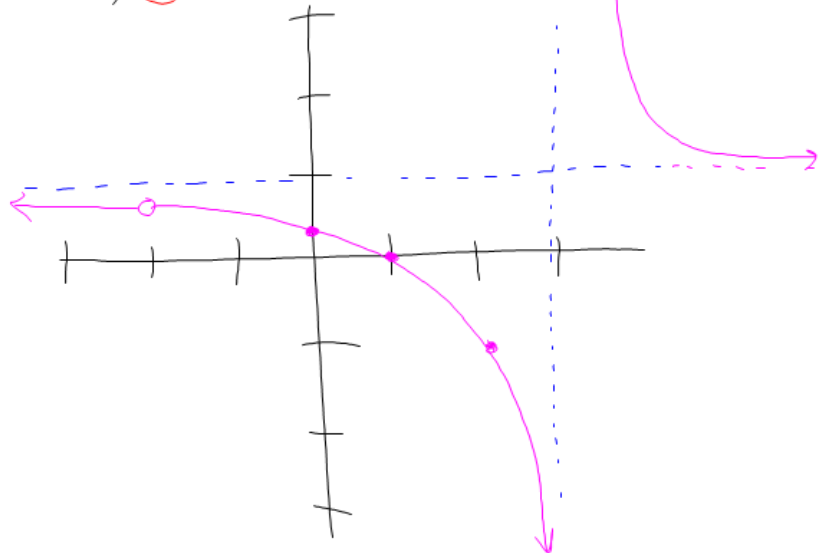
V.A. $(x-3)(x+2)$
 $x = -2, 3$

H.A. $y = 1$

X-int $(x+2)(x-1)$
 $x = 1, -2$

hole
Not an
asymptote

Y-int. $= \frac{1}{3}$



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$$\text{V.A. } -4x^3 + 5 = 0$$

$$-4x^3 = -5$$

$$x^3 = \frac{5}{4}$$

$$x \approx 1.07$$

$$\text{H.A. } y = \frac{-3}{4}$$

$$\text{x-int } 3x^3 + 7x^2 + 2$$

$$\frac{\pm 1, \pm 2}{\pm 1, \pm 3}$$

$$\begin{array}{r} 1 \overline{) 3 \ 7 \ 0 \ 2} \\ \underline{3 \ 10 \ 10} \text{ upper bound} \\ 3 \ 10 \ 10 \ 12 \end{array}$$

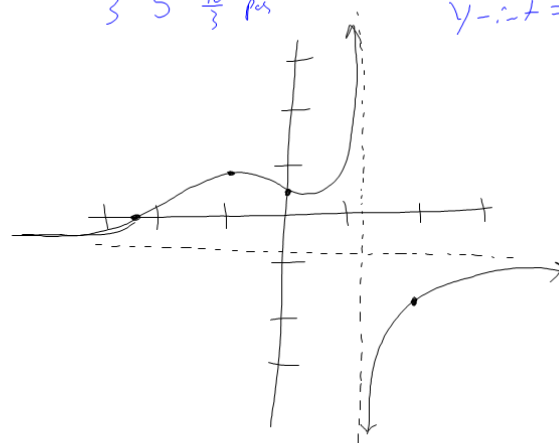
$$\begin{array}{r} -2 \overline{) 3 \ 7 \ 0 \ 2} \\ \underline{-6 \ -2 \ 4} \\ 3 \ 1 \ -2 \ 6 \end{array}$$

$$\begin{array}{r} -1 \overline{) 3 \ 7 \ 0 \ 2} \\ \underline{-3 \ 4 \ 4} \\ 3 \ 4 \ -4 \ 6 \end{array}$$

$$\begin{array}{r} -\frac{2}{3} \overline{) 3 \ 7 \ 0 \ 2} \\ \underline{-2 \ -\frac{10}{3} \ \frac{20}{3}} \\ 3 \ 5 \ -\frac{10}{3} \end{array} \text{ pos}$$

$$\text{x-int } \approx -2.44$$

$$\text{y-int } = \frac{2}{5}$$



Slant Asymptotes

If the degree of $N(x)$ is exactly 1 bigger than the degree of $D(x)$, then there is a slant asymptote. To find the slant asymptote, long divide and take the whole part of the answer (i.e. not the remainder)

$$f(x) = \frac{x^2 - x}{x+1}$$

$$x+1 \overline{) \begin{array}{r} x^2 - x + 0 \\ x^2 + x \\ \hline -2x + 0 \\ -2x - 2 \\ \hline 2 \end{array}}$$

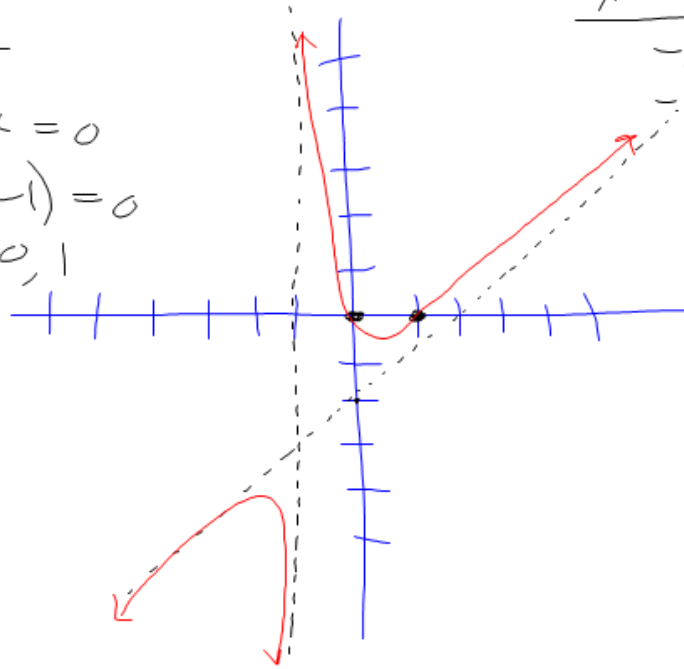
$x - 2 + \frac{2}{x+1}$

$$x - \text{int}$$

$$x^2 - x = 0$$

$$x(x-1) = 0$$

$$x = 0, 1$$



Sect. 2.7

#19-25 (odd)

43-47 (odd)